

Remarks

In the Final Office Action of February 9, 2006, the Examiner contends that the amendment of January 10, 2006 introduces new matter into the disclosure in a manner inconsistent with 35 U.S.C. § 132(a), and states that the Applicant is required to cancel the new matter in replying to the present Office Action. For the same reasons, claims 1-9 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

Claims 1-2, 4 and 5 were rejected under 35 U.S.C. § 102(b) as anticipated by Dahms '159, claim 3 was rejected under 35 U.S.C. § 103(a) as obvious over Dahms '159 in view of Dahms '711, and claims 6, 7 and 9 were rejected under 35 U.S.C. § 103(a) as obvious over Dahms '159 in view of Clouser et al. '887, claim 8 was rejected under 35 U.S.C. § 103(a) as obvious over Dahms '159 in view of Clouser et al. '887, and further in view of Dahms et al. '711, claim 2 was rejected under 35 U.S.C. § 103(a) as obvious over Dahms et al. '711 in view of Dahms '159, claims 6, 8 and 9 were rejected under 35 U.S.C. § 103(a) as obvious over Dahms et al. '711 in view of Clouser et al. '887.

Regarding the issues under 35 U.S.C. § 132(a) and 35 U.S.C. § 112, first paragraph, in the prior amendment, claims 1 and 6 were amended to limit the surface roughness to "less than 2.0 μm without surface treatment." The present Office Action contends that such an amendment is not supported by the original disclosure, pointing to page 8, lines 10-18. In response, Applicant points out that such a range is supported by the original disclosure at, for example, page 12, lines 20-22 ("in accordance with the present invention, a roughness (Rz) of a rough surface is controlled less than 2.0 by the sulfur compound") and page 15, lines 4-6 ("a roughness Rz value of a rough surface (mat surface) with a range of less than 2.0 μm "). Since it appears there is support for the amendment, Applicant respectfully submits that the prior amendment complies with the provisions of 35 U.S.C. § 132(a) and that the rejection of the claims under 35 U.S.C. § 112, first paragraph, should be withdrawn.

Regarding the rejections of the claims under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a), Applicant has amended the claims to further distinguish the claimed invention from the references of record. In particular, independent claims 1 and 6 have been amended to further limit the claims to a copper foil "with current density 20 A/dm^2 to 100 A/dm^2 ". Support for this amendment is found, for example, in the original disclosure on page 9, line 3 which states that "Current density is between 20 A/dm^2 and 100 A/dm^2 ."

The electrolyte composition and current density are important factors to make the copper foil with uniform surface roughness. It will take an unreasonable amount of time to generate copper foil with sufficient roughness if the current density is below 20 A/dm^2 . And,

if the current density is greater than 100 A/dm^2 , the copper foil will be formed around the area of the edge very quickly, making it impossible to generate the copper foil with uniform roughness.

The references of record expressly disclose and teach a current density range much lower than the range specified by the present amended claims. In particular, the Dahms '159 reference discloses 6 examples, all of which have a current density well below 20 A/dm^2 , the low end of the present claimed range: (I) "current density of 0.15 A/dm^2 to 4 A/dm^2 " (column 5, lines 32-33), (II) "current density of 7 A/dm^2 " (column 5, line 46), (III) "current density of 5 A/dm^2 and with a current density of 0.8 A/dm^2 below" (column 5, lines 62-64), (IV) "average current density of 2 A/dm^2 " (column 6, line 16), (V) "current density of 2.5 A/dm^2 " (column 6, lines 26-27), and (VI) "current density of from 0.2 to 7 A/dm^2 ." Similarly, the Dahms et al. '711 reference teaches a current density well below 20 A/dm^2 , the low end of the present claimed range. The general teaching of Dahms et al. '711 is found in column 9, lines 36-37 which discloses a cathodic current density of 0.5 - 12 A/dm^2 and a preferred range of 3 - 7 A/dm^2 , and all of the disclosed examples teach a current density within this range.

Thus, not only do the references of record disclose a current density range well below the claimed range, such references teach away from the claimed range in that Dahms et al. '711 expressly indicated a preferred range of 3 - 7 A/dm^2 . Even more importantly, however, to the Applicant it appears that copper foil having a rough surface with roughness below $2 \mu\text{m}$ without surface treatment as claimed cannot be generated according to the current density taught by the references of record. In view of at least this clear distinction between the claimed invention and the prior art of record, Applicant submits that the claims are allowable and respectfully requests withdrawal of the rejections under 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a).

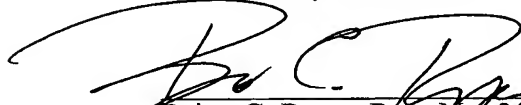
Furthermore, with respect to the rejection of claims 6, 7 and 9 under 35 U.S.C. § 103(a) based upon a combination of the Dahms '159 reference and the Clouser et al. '887 reference, such references are not properly combinable because of the dramatically different range of concentrations of organic additives. In particular, the Clouser et al. '887 reference states that "It is critical that the concentration of organic additives in the electrolyte solution be in the range of up to about 0.2 ppm , and in one embodiment up to about 0.1 ppm . In one embodiment, no organic additives are added, and thus the concentration of said organic additives is zero." (column 7, lines 24-28) In very significant contrast, the Dahms '159 reference teaches a range of organic compounds between about 0.02 to 8.0 g/liter . (Column 4, Table III) In other words, the Clouser et al. '887 reference expressly indicates it is critical to keep the organic additives concentration below 0.0002 g/liter , while the Dahms '159 reference teaches a range of 0.02 to 0.8 g/liter . This extremely significant difference –

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several orders of magnitude for a critical concentration -- would discourage one of ordinary skill from combining the references as suggested in the Office Action. For this reason alone, the rejection of claims 6, 7 and 9 should be withdrawn.

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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